

# Land Product Validation (LPV) Sub-group Meeting



Fernando Camacho – (EOLab/U. Valencia) – Chair

Vice Chair – Vacant

Subgroup meeting

05 Feb 2019

**NEXT LPV TELECON 02 Apr 2019**

# Attendance

## Participants

Fernando Camacho  
Jaime Nickeson  
Zhuosen Wang  
Tomoaki Miura  
Sylvain Leblanc  
Else Swinnen  
Laura Duncanson  
John Armston  
Glynn Hulley  
Luigi Boschetti  
Carsten Montzka  
Frank Göttsche  
Michael Cosh  
Sophie Bontemps

Dominique Carrer  
Pontus Olofsson  
Joshua Gray

## Excused

Hongliang Fang  
Marie Weiss  
Ian Grant  
Gareth Roberts

## Absent

Mat Disney  
Andrew Edwards  
Thomas Nagler  
Jadu Dash

# Proposed agenda items

- Welcome
- Vice-Chair nominations
- CEOS Work Plan (2019-2021)
- Update on supersites : ESA FRM4Veg & FLEX MAG
- Next LPV Plenary at LPS – to define LPV Work Plan (2019-2021)
- Annual Web Site Review and Listserv update
- Focus Area Reporting

# Vice Chair nominations/Holes

We have a nominee (Laura Duncanson) for the Vice Chair position, but still awaiting for NASA support approval before accepting the position.

Then, we should vote the candidature and finally the WGCV has to accept formally our new Vice Chair ( expected time in March).

We **STILL** have remaining vacancies in our LPV working group

- Need a volunteer to help with **Snow**
- And need a co-lead to work with Marie on **Fapar**

**Please** ask around to help us find candidates!!!

# CEOS Work Plan (2019-2021)

CEOS Work Plan (2019-2021) being updated. Work Plan is three year period, updated every year.

Minor updates on the existing CARBOn actions.

- Laura Duncanson main contact for these actions (in replacement of Miguel)
- Protocol biomass expected for Q3/2019

New CARB actions proposed by Steven Hosford (ESA)

- CARB-16-2018-6 - Promotion of the biomass data sharing / analysis system as a community platform → no clear link with LPV activities (to be discussed)
- CARB-16-2018-7 BRIX-II –Biomass Intercomparison Exercise-II. Following BRIX, to extend to airborne L band and LiDAR. ESA/NASA coordination activity - LPV members has a positive view on this.
- Acceptance / modifications of these actions on Biomass group need to be determine on the next two weeks.

# Supersites update : ESA FRM4Veg & FLEX MAG

Several discussions on Supersites (based on CEOS LPV supersites) are being conducted in ESA.

- FRM4Veg project for S2/S3/PV (Reflectance and Vegetation products) is ending Phase 1 (Wytham and Barrax) and preparing Phase 2 (new supersites to be instrumented, long-term, multi-sensor multi-product validation). CEOS LPV supersites in Europe were ranked. Two LPV supersites were proposed: Hainich (De) and Hyytalia (Fn) + other additional sites. (Selection under discussion).
- LPV supersites presented in the last FLEX MAG meeting (30-31 January, Sp) for FLEX cal/val. It was agreed to perform cal/val in at least one of the site selected by FRM4Veg in the FLEX activities

CEOS LPV will coordinate a meeting FRM4Veg (S2/S3/PV), FLEX and EC GBOV activities for establishment of European supersites (14 February).

LPV Supersites list in Europe to be updated in line with FRM4Veg, GBOV and FLEX cal /val activities, and new sites being proposed (eg, Lonzée, Bg).

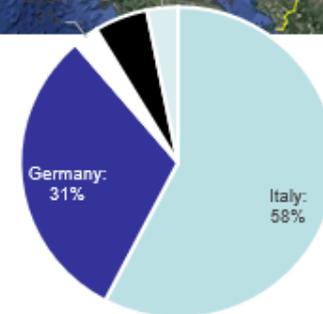
# FLEX Campaigns 2018

## FLEX campaigns 2018

- Five sites in Europe
  - AtmoFLEX sites: Italy, France & Jülich/Campus Klein-Altendorf
  - Additional sites: Zurich & Spain
- Two sites in USA/Canada
- Flight strategy
  - Mapping of the Sentinel-3 pattern, close to Sentinel-3 overpass (high overpasses)
  - Integrated FLEX-like measurements from the ground to the satellite
- 8 weeks in June/July 2018



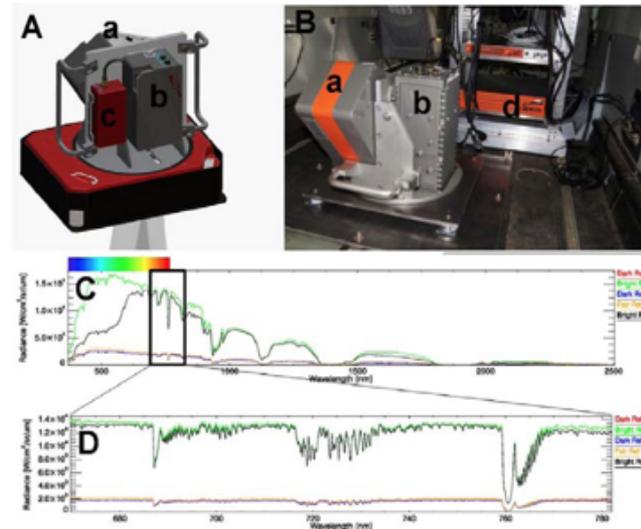
	No. of flight lines
Italy	200
Germany	108
Spain	9
France	19
Switzerland	11



# FLEX Campaigns 2018

## Core airborne sensor for fluorescence measurements: *HyPlant*

- HyPlant: Core instrument of several ESA campaigns
- Sensor in 2018 was carefully tested, some parts were exchanged and realigned, vacuum resealed, GPS unit upgraded, and full calibration / characterization of all components was performed ⇒ HyPlant\_3 available since 2018 having improved radiometric performance and geometric accuracy
- DUAL module (380 – 2500 nm)  
VIS/NIR: 3-4 nm FWHM, 1.7 nm SSI, SNR >510  
SWIR: 13 nm FWHM, 5.5 nm SSI, SNR >1100
- FLUO module (670 – 780 nm)  
0.25 nm FWHM, 0.11 nm SSI, SNR >210



# LPV Plenary at LPS – define LPV Work Plan

- Next LPV Plenary at the Living Planet Symposium : 13-17 May 2019, Milan (It)
- Road map for the new chair (2019-2021) period
- Starting from the current status of each FA, **defining an action plan for the next three years** (protocol developments, cal/val data coordination, workshops, communication). Attendance of at least 1 representative for FA is required.
- LPV Work Plan should be mainly defined internally in response to CEOS agencies validation needs. Key items could be adopted at WGCV and CEOS Work Plan.

# Annual Web Site and Listserv Review

- We are way past our due date for annual review of these.
- I'd like to complete this exercise in a reasonable time frame. The last update took way too long.
- Each of you please read through all of your pages and products and send me updates. These are not meant to be static pages, new researchers enter the field all the time, and new products are developed.
- Please make sure all your information is current!
- I will distribute community and product lists to each focus area for update.

# Focus Area Reports

- Land Cover
- FAPAR
- Fire/Burn Area
- LAI
- Phenology
- LST&E
- Surface radiation
- Soil Moisture
- Vegetation Indices
- Snow
- Biomass

# Land Cover

- Operational production of global LC map in the context of the Copernicus Climate Change Service (C3S) - 2016 and 2017 delivered
- Validation Database (inherited from ESA Climate Change Initiative project) updated for the years 2017 - 2018
- Ongoing validation of new products

# Fapar

## New Products (LAI/FAPAR)

- CDR from Copernicus Climate Change (C3S)
  - First version: GEOV1 (AVHRR-VGT) + Reflectance Error propagation on LAI/FAPAR

<https://cds.climate.copernicus.eu/cdsapp#!/dataset/satellite-albedo?tab=doc>

- Future version: JRC/TIP algorithm: LAI/FAPAR derived from Albedo
- OGVI ~ MGVI for SENTINEL3 is available
  - OLCI Global Vegetation Index
  - Full (300m)/reduced (1.2km) resolution
  - Together with OTCI (terrestrial Chlorophyll Index)

<https://sentinel.esa.int/web/sentinel/sentinel-data-access>

- GBOV data are available over USA sites
- Do not forget the living Planet Symposium (13-17 May 2019)
- Joint Session with LAI at IGARSS'19 may not happen (awaiting US submissions due to shutdown). A joint fAPAR/LAI meeting is still scheduled<sub>3</sub>

# Fire/Burned Area

- Gareth working on active fire and FRP protocol.
- On the burned area side, there have been quite a lot of papers recently published.
- Just published the stage 3 validation of the MODIS product MCD64
- There is some talk with INRA to start looking into other biophysical parameters related to fire, a quantitative assessment of severity for a carbon related project, but this is somewhere down the line. We should have more information by the time of LPS.
- Luigi will be attending LPS, but has JRC meetings, so a planned date for the LPV Plenary will be appreciated.

# LAI

- Last minute submission to special LAI/SAPAR session in IGARSS'19.
  - <https://igarss2019.org/Papers/Submission.asp?SessionType=Invited&ID=2046&Code=56E01C57>
  - Now has five abstracts. Consider L5: Land Applications:: Agriculture
  - H. Fang, R. Fernandes, S. Leblanc, M. Weiss, and others will meet at IGARSS.
- Validation Activities
  - M. Weiss will visit Beijing (H. Fang), Mar 19-29, 2019.
  - LAI overview paper, resubmitted to *Review of Geophysics* after revision. Coauthors: H. Fang, F. Baret, S. Plummer, and G. Schaepman-Strub
  - Quantitative Remote Sensing Forum in Nanjing, China, Jun 15-16, 2019.
- Reviewed ICOS Green Area Index (GAI) measurement protocol (H. Fang) (Gielen et al., 2018. International Agrophysics. doi: 10.1515/intag-2017-0048).
  1. The GAI is slightly different from the RS LAI, but could be converted to LAI.
  2. ICOS recommends the linear ceptometer as the first choice. This instrument needs calibration and is less popular in the LPV/LAI community.
  3. Digital Hemispherical Photography (DHP) is recommended for forest, which could be considered as a standard protocol.
  4. The spatial sampling design can be incorporated in the LAI validation protocol.
  5. The temporal sampling design focuses on the vegetation growth cycle, whereas LPV/LAI emphasizes concurrent LAI sampling with the satellite overpass.

# Phenology

- Special issues in *Remote Sensing*
  - Deadline: Dec 31<sup>st</sup>, 2019
  - 48 submitted; 16 published; 4 under review
  - [https://www.mdpi.com/journal/remotesensing/special\\_issues/ldp\\_rs](https://www.mdpi.com/journal/remotesensing/special_issues/ldp_rs)
- Side meeting of Pheno community at Living Planet 2019
- Newsletter to go out soon
- Workshop planning for 2020 (possibly in Europe)

# LST & Emissivity (1/2)

- LST book ('Taking the Temperature of the Earth') is being typeset and scheduled to be published around May 2019
- *Remote Sensing* SI 'Applications of Land Surface Temperature and its Combination with other Satellite Land Products'
  - Submission closed on 31 Dec 2018
  - [www.mdpi.com/journal/remotesensing/special\\_issues/Land\\_Surface\\_Temperature](http://www.mdpi.com/journal/remotesensing/special_issues/Land_Surface_Temperature)
  - 11 papers published so far
- *Remote Sensing* Special Issue 'Remotely Sensed LST'
  - Manuscript submission deadline: 31 May 2019
  - [www.mdpi.com/journal/sensors/special\\_issues/Land\\_Surface\\_Temperature\\_RS](http://www.mdpi.com/journal/sensors/special_issues/Land_Surface_Temperature_RS)
  - Guest editors: C.C. DaCamara and S.L. Ermida
- EGU, 7-12 April 2019, Vienna, Austria; 'Taking the Temperature of the Earth'
- ESA Living Planet Symposium, 13-17 May 2019, Milan, Italy, 'LST CCI Project'

# LST & Emissivity (2/2)

- ECOSTRESS status:
  - On December 5th 2018 ECOSTRESS switched to Mass Storage Unit Side-B and resumed science operations.
  - Data available through early adopter program:
    - [https://ecostress.jpl.nasa.gov/applications/app\\_request](https://ecostress.jpl.nasa.gov/applications/app_request)
  - NASA ROSES: A.7 ECOSTRESS SCIENCE AND APPLICATIONS TEAM

# Surface Radiation

## Protocol

- The albedo validation best practice protocol has been finalized. We are requesting DOI for the document.

## New Products / Validation Datasets

- New VIIRS albedo product (daily, gap-filled, including snow alb.) in prep. -> NOAA Wang et al. paper in prep.
- GBOV validation dataset for Copernicus Global Land Service products (VGT/PROBA-V)
  - collection of in situ data for representative site selection
  - reconstruction of surface albedo from in situ measurements, rescaled to the VGT/PROBAV pixel size
  - see ATBD available on

[https://gbov.acri.fr/public/docs/products/GBOV-ATBD-RM1-LP1-LP2\\_v1.2-Energy.pdf](https://gbov.acri.fr/public/docs/products/GBOV-ATBD-RM1-LP1-LP2_v1.2-Energy.pdf)

# Soil Moisture (1/2)

## SMAP

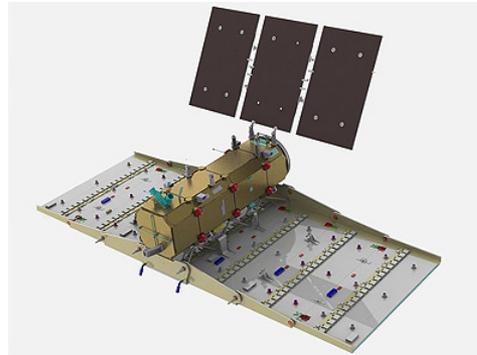
- SMAPVEX19 spinning up, pending future shutdowns, including collaborations with ESA
- SMAP-Sentinel paper has been sent in for review.

## NISAR

- The NASA-ISRO Synthetic Aperture Radar mission (~2021) will monitor in L-band via radar at a high resolution (~100m) nominally every 12 days (2 overpasses/12 days).
- Ag and SM working group forming
- Summer 2019 UAVSAR campaign for mimicking NISAR coverage

## SAOCOM 1A

- Successful launch Oct 8<sup>th</sup>.
- 1B planned for 2019 launch
- L-band SAR



## Other

- Alternative SMOS products are being developed (SMOS-IC: SMOS-INRA-CESBIO) with improved performance
- U.S. National Soil Moisture Network initiative is gaining steam.
- Alex Gruber draft of SM Error Assessment manuscript
- Good Practices Protocol Outline Developed

# Soil Moisture (2/2)

## Workshops/Meetings

- Living Planet Symposium, May 13-17, 2019, Milan, Italy, Francesco Mattia leading soil moisture session
- 6<sup>th</sup> Satellite Soil Moisture Validation and Application Workshop, TBD (Sep-Oct) 2020, Perugia, Italy
- 7<sup>th</sup> Satellite Soil Moisture Validation and Application Workshop, Fall 2022, New Orleans, USA

# Vegetation Indices (1/3)

The VI Focus Area held a one-day CEOS WGCV LPV Vegetation Index Focus Area Workshop in Washington DC, concurrent with AGU

- This second VI focus area workshop was held to review new VI products, and new VI validation activities and results, and to discuss product inter-comparison protocols to decide a set of standard metrics.
- A total of 14 presentations were given by participants, followed by a 45-min discussion.
- New products introduced
  - MODIS and VIIRS NBAR EVI
  - Chlorophyll Carotenoid Index (CCI) as an indicator of photosynthetic (GPP) phenology
  - Himawari Geostationary Satellite NDVI
  - Copernicus Multi-sensor NDVI product
  - NOAA JPSS VIIRS temporally-composited VI products
- The workshop discussed that the focus of product inter-comparison was to characterize the differences and their spatial and temporal distribution

# Vegetation Indices (2/3)

## Recommendations Emerging from the VI Focus Area Workshop

- The workshop participants agreed to recommend the statement below:
  - CEOS recommends that the validation document of a VI product include:
    - 1) product QA information
    - 2) uncertainty information obtained via validation (NIST-traceability)
    - 3) product inter-comparison results
- The workshop participants agreed to adopt the “time series validation” approach as a standard VI validation methodology where validation focuses on validating the quality of VI time series data as to how well VI products capture seasonal evolution of vegetation. Recommended time series data for this approach include: FLUXNET data (GPP), NPN, Phenocam, and PEN.

# Vegetation Indices (3/3)

The workshop participants identified and agreed on the below-listed datasets suitable for characterizing delta VIs:

- Field spectrometer time series data (PEN)
- Opportunistic UAV LTAR data
- Opportunistic NEON data
- Higher resolution satellite data, given that higher resolution satellite data are validated against ground measurements (e.g., Sentinel/Landsat to VIIRS/MODIS/PROBA-V/Sentinal-3)

Participating in the Living Planet Symposium, Milan, May 2019

- Establishing a CEOS WGCV LPV protocol for the inter-comparison of Vegetation Index Datasets

# Snow

# Above Ground Biomass

- **GEDI successfully launched Dec 5, data look great!**
- Review paper in revision (minor reviews): 'The importance of biomass product validation' Duncanson et al., Surveys on Geosciences (many focus area co-authors)
- Protocol well under way, chapters currently being finalized, summary chapters are in draft form (goal to have complete draft of protocol by end of Feb, 2019)
- Potential new LPV-relevant activity: BRIX2 (biomass algorithm intercomparison)
- Monthly multi-mission biomass calls with members of GEDI, ESA BIOMASS, ICESat-2 and NISAR toward collaborative data collection and sharing, currently curating set of 'carbon supersites' for new field, TLS, airborne lidar acquisitions
- ESA BIOMASS and GEDI team planning to acquire new data useful to all missions from these 'carbon supersites'
- Discussions with members of GFOI and CEOS SDCG on streamlining biomass relevant activities, will meet with them in March